Implications of genetic correlations between linear gait and jumping traits in the sport horse

K. F. Stock[1*], I. Workel[2], A. Hahn[2], W. Schulze-Schleppinghoff[2]

[1]IT Solutions for Animal Production (vit), Verden (Aller), Germany,
[2]Oldenburger Pferdezuchtverband e.V., Vechta, Germany;
[*]Contact (corresponding author): friederike.katharina.stock@vit.de

Routine implementation of linear description in the sport horse has given access to detailed and more objective information on specific aspects of both conformation and performance, and the improved individual characterization of horses with regard to gaits and jumping should benefit breeding applications. However, the larger number of traits implies the need of thorough analyses of correlation patterns in order to optimize the use of linear profiling in the breeding program. The aim of this study was to use the results of the routine genetic evaluation for linear traits of the Oldenburg studbooks for analyzing the genetic correlations between distinct aspects of walk, trot, canter and jumping. Based on linear data from 2012 to 2019 which included approximately 15,000 linear profiles of foals and 9,000 linear profiles of adult horses, breeding values were estimated in linear animal models and in a bivariate setting for traits analogously assessed in both age groups (N=2 for walk, N=6 for trot) and univariately for traits assessed only in adult mares and/or stallions (N=4 for canter, N=10 for jumping). Using the genetic proofs of all sires with linearly described progeny (N=2,629 stallions with on average 8.7 progeny), Pearson correlation coefficients between indices and individual breeding values for gaits and jumping were calculated within and across trait groups with SAS software. Correlation analyses revealed very close genetic correlation of 0.92 only between the walk traits referring to reach of front and hind limbs, respectively. The correlations among the other traits within trait group were considerably lower: 0.41 to 0.77 for trot, 0.50 to 0.67 for canter, and 0.42 to 0.71 for jumping. The varying and overall moderate reliabilities of breeding values must be considered when interpreting the results, but there were no indications of redundancies in the system. The correlation patterns indicate that the significantly positive genetic correlations between traits could be favorably used in a larger multivariate setting in which breeding values are jointly estimated for different aspects of gaits and jumping.